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Effective Solution for Finite Element Problems with Nonlinear Constraints

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Solutions of problems of Mechanics are nowadays obtained most often be using Finite Element Method. This method provides the solution usually in the form of linear algebraic equations. In cases when the equations become nonlinear due to imposed constraints, effects of material or geometrical nonlinearity, optimization, identification, etc, all equations are considered nonlinear and are solved using iterative techniques, for example: Newton-Raphson method. However, there are difficulties with convergence and effectiveness of this approach. This paper presents a new, very effective solution for the above problems by reducing the number of nonlinear variables. A new algorithm has been developed and applied to various identification and adaptive modeling problems with excellent results. The new algorithm allows for the solution of cases that were not solved previously due to the lack of convergence and large number of nonlinear variables.

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